PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of

Xing LI et al.	On Appeal from Group: 2624
Application No.: 10/709,833	Examiner: WOLDEMARIAM, A.
Filed: June 1, 2004	Docket No.: 119021

For: SYSTEMS AND METHODS FOR ADJUSTING PIXEL CLASSIFICATION USING
BACKGROUND DETECTION

APPEAL BRIEF TRANSMITTAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

Attached hereto is our Brief on Appeal in the above-identified application.

The Commissioner is hereby authorized to charge Deposit Account No. 24-0037 in the
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Respectfully submitted,

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BRIEF ON APPEAL

Appeal from Group 2624

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I.   **REAL PARTY IN INTEREST**

The real party in interest for this appeal and the present application is Xerox

Corporation, by way of an Assignment recorded in the U.S. Patent and Trademark Office at

Reel 014676, Frame 0262.

II. RELATED APPEALS AND INTERFERENCES

There are no prior or pending appeals, interferences or judicial proceedings, known to

Appellants, Appellants' representative, or the Assignee, that may be related to, or that will

directly affect or be directly affected by or have a bearing upon, the Board's decision in the

pending appeal.

III.   <u>**STATUS OF CLAIMS**</u>

Claims 1-22 are on appeal.

Claims 1-22 are pending.

Claims 1-22 are rejected.

IV.   **STATUS OF AMENDMENTS**

No Amendment After Final Rejection has been filed.

V.   SUMMARY OF CLAIMED SUBJECT MATTER

The invention of independent claim 1 is directed to a pixel classification method ([0001], [0013] and [0027], all citations reference the paragraphs and figures of the application as filed). The method includes determining a background intensity level of an image ([0014], lines 1-4; [0054], lines 8-10; [0055], lines 1-4; [0056], lines 3-10; and [0058], lines 1 and 2; and in Fig. 9, S910), the background intensity level being based on substantially all of the pixels of the image ([0014], lines 1-4; [0015], lines 2-5; [0016], lines 2-4; [0056], lines 9-12; and [0058], lines 2-4; and Fig. 9, S910), classifying a pixel of the image without adjusting an intensity of the pixel ([0015], lines 5-7; [0016], lines 4 and 5; [0027], lines 1-4; [0028], lines 3 and 4; [0036], lines 3-5; [0040]; [0041]; [0042], lines 11-12; [0044], lines 5-13; [0046], lines 1-11; [0052], lines 1-3; and [0058], lines 4 and 5; and Fig. 9, S920), confirming the classification of the pixel based on the determined background intensity level of the image by comparing the intensity of the pixel with the determined background intensity level ([0014], lines 4-6; [0015], lines 5-8; [0016], lines 5 and 6; [0028], lines 7-10; [0058], lines 5-7; [0062], lines 5-7; and [0063], lines 1-3; and Fig. 9, S930), determining if reclassification is required ([0054], lines 8-11; [0058], lines 7-10; [0062], lines 5-7; and [0063], lines 1-3; and Fig. 9, S940), and reclassifying the pixel when reclassification is required ([0016], line 7 and 8; [0027], lines 12-14; [0054], lines 8-11; [0059], lines 1-7; [0060], lines 1-6; [0061], lines 1-4; and [0062], lines 10-12; and Fig. 9, S940).

The invention of independent claim 8 is directed to a pixel classification apparatus ([0015], lines 1 and 2; [0027], lines 1-4; and [0042], lines 1-3). The apparatus includes a background intensity level determining module ([0015], lines 2-5 and [0027], lines 1-12; and Fig. 2, image processing unit 70 and computing unit 110, and Fig. 3) that determines a background intensity level of an image based on substantially all of the pixels of the image ([0014], lines 1-4; [0015], lines 2-5; [0016], lines 2-4; [0056], lines 9-12; and [0058], lines 2-4; and Fig. 9, S910), and an image processing module ([0015], lines 5-8; [0027], lines 1-12;

[0033]; and [0064], lines 1-7; and Fig. 2, image processing unit 70 and computing unit 110, and

Fig. 3) that classifies a pixel of the image without adjusting an intensity of the pixel ([0015],

lines 5-7; [0016], lines 4 and 5; [0027], lines 1-4; [0028], lines 3 and 4; [0036], lines 3-5;

[0040]; [0041]; [0042], lines 11-12; [0044], lines 5-13; [0046], lines 1-11; [0052], lines 1-3; and

[0058], lines 4 and 5; and Fig. 9, S920), confirms the classification of the pixel based on the

determined background intensity level of the image by comparing the intensity of the pixel with

the determined background intensity ([0014], lines 4-6; [0015], lines 5-8; [0016], lines 5 and 6;

[0028], lines 7-10; [0058], lines 5-7; [0062], lines 5-7; and [0063], lines 1-3; and Fig. 9, S930),

determines if reclassification is required ([0054], lines 8-11; [0058], lines 7-10; [0062], lines 5-

7; and [0063], lines 1-3; and Fig. 9, S940), and reclassifies the pixel when reclassification is

required ([0016], line 7 and 8; [0027], lines 12-14; [0054], lines 8-11; [0059], lines 1-7; [0060],

lines 1-6; [0061], lines 1-4; and [0062], lines 10-12; and Fig. 9, S940).

The invention of independent claim 15 is directed to a image processing method

([0001], [0013] and [0027]). The method comprises determining a background intensity level

of an image ([0014], lines 1-4; [0054], lines 8-10; [0055], lines 1-4; [0056], lines 3-10; and

[0058], lines 1 and 2; and in Fig. 9, S910), the background level being based on substantially all

of the pixels of the image ([0014], lines 1-4; [0015], lines 2-5; [0016], lines 2-4; [0056], lines 9-

12; and [0058], lines 2-4; and Fig. 9, S910), classifying a pixel of the image ([0015], lines 5-7;

[0016], lines 4 and 5; [0027], lines 1-4; [0028], lines 3 and 4; [0036], lines 3-5; [0040]; [0041];

[0042], lines 11-12; [0044], lines 5-13; [0046], lines 1-11; [0052], lines 1-3; and [0058], lines 4

and 5; and Fig. 9, S920), checking the classification of at least a portion of the pixels of the

image based on the determined background intensity level of the image ([0014], lines 4-6;

[0015], lines 5-8; [0016], lines 5 and 6; [0028], lines 7-10; [0058], lines 5-7; [0062], lines 5-7;

and [0063], lines 1-3; and Fig. 9, S930), reclassifying pixels based on the results of the checking

step ([0016], line 7 and 8; [0027], lines 12-14; [0054], lines 8-11; [0059], lines 1-7; [0060],

lines 1-6; [0061], lines 1-4; and [0062], lines 10-12; and Fig. 9, S940), and processing the image

data of the pixels of the image based on the classification of the pixels ([0016], lines 3-7;

[0040], lines 7-9; [0053], lines 1-4; [0064], lines 1-7).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following grounds of rejection are presented for review:

1) Claims 1 and 8 are rejected under 35 U.S.C. §102(b) over Fan et al. (U.S. Patent Application Publication No. 2003/0072487 A1) (hereinafter "Fan$_1$");

2) Claims 15, 16 and 22 are rejected under 35 U.S.C. §102(b) over Fan et al. (U.S. Patent No. 5,850,474) (hereinafter "Fan$_2$");

3) Claims 2-7, 9-14 are rejected under 35 U.S.C. §103(a) over Fan$_1$ in view of Li et al. (U.S. Patent No. 6,360,009) (hereinafter "Li"); and

4) Clams 17-21 are rejected under 35 U.S.C. §103(a) over Fan$_2$ in view of Li.

VII.   ARGUMENT

The current claims on appeal are directed to method and an apparatus for classifying pixels and a method of processing an image. In particular, the claims recite method and apparatus that classify pixels of an image, and subsequently check the classification of the pixels based on the background intensity of the image, and reclassify the pixels when the check indicates that a reclassification is necessary. The claims on appeal involve determining the background intensity of the image based on substantially all of the pixels in the image. As will be discussed below, with regard to the independent claims, the applied references fail to disclose or render obvious any such technique or apparatus.

Arguments presented below have been previously submitted to the Examiner both in formal responses to Office Actions and in the personal interview conducted on November 6, 2007.

Appellants submit that independent claims 1 and 8 and their dependent claims stand or fall together, and that independent claim 15 and its dependent claims stand or fall together, but separate from claims 1 and 8.

A.   Claims 1-14 Are Not Anticipated or Rendered Obvious by Fan[1] (U.S. Patent Application Publication No. 2003/0072487 A1) or Fan[1] in view of Li (U.S. Patent No. 6,360,009)

1.   Independent Claims 1 and 8

Fan[1] is directed to a method for segmenting an image using a background-based segmentation process. Fan[1] discloses a method that requires the image under process to be processed at two different resolutions (low and original resolution). The process originates with segmenting the image and passing the image through a low pass filter. The image is decimated and processed at low resolution by a segmentation stage. The segmented results identify a main background portion of the image and other objects of the image. Thus, the main background is a segment of the image. Further, the process determines local

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backgrounds and other objects for areas that are unable to be classified as text or pictures. This is repeated through an iterative process until all objects are classified as text or picture classes. This segmented low pass result is overlaid with the original resolution image. See paragraphs [0013] and [0014] of Fan_1.

Fan_1 goes on to disclose that that the image is <u>segmented</u> into a main background, local backgrounds, picture objects and text objects. See paragraph [0015] of Fan_1. Thus, even Fan_1's main background is <u>segmented,</u> and therefore, it is <u>not</u> *based on substantially all of the pixels of the image*. Fan_1 also discloses that the border of the main background and other <u>adjacent</u> backgrounds and objects is refined. Fan_1 discloses that the main background is determined by identifying NxN uniform blocks and growing the uniform blocks by assessing the color difference of adjacent pixels. The plurality of the NxN blocks are grown, and the block with the largest bounding area is identified as the main background. See paragraph [0021] of Fan_1. Thus, Fan_1 discloses that the main background or any determined background of the Fan_1 method is <u>not</u> *based on substantially all of the pixels*. Furthermore, Fan_1 bases background detection on <u>color differences,</u> and not <u>intensity</u>. The Final Rejection asserts that the "main background" 304 of Fig. 3 of Fan_1 corresponds to an intensity level. However, the Final Rejection fails to provide a technical or even brief or suggestive explanation of how the element 304 corresponds to an intensity level. Appellants submit that, despite the allegations of the Final Rejection, Fan_1 discloses that background determinations are based on <u>color,</u> not intensity levels.

Independent claims 1 and 8 recite a method and apparatus that determine a <u>background intensity level </u>of an image based on <u>substantially all of the pixels of the image</u>. As described above, Fan_1 fails to disclose, render obvious or even address intensity levels, and therefore fails to determine a background <u>intensity</u> level. Furthermore, Fan_1 fails to base any determination, let alone a background intensity level determination, on substantially all of

the pixels of the image. Conversely, Fan₁ repeatedly describes <u>segmenting</u> the image and then

determining <u>color differences</u> to assign properties. Thus, Fan₁ fails to disclose or render

obvious a method or apparatus that determines a <u>background intensity level</u> of an image, the

background intensity level being based on <u>substantially all of the pixels</u> of the image.

Furthermore, because Fan₁ fails to determine a background intensity level of an

image, Fan₁ fails to disclose or render obvious the method or module that confirms the

classification of a pixel <u>based on the determined background intensity level</u> of the image by

comparing the intensity level of the pixel with the <u>determined background intensity level,</u>

determining if reclassification is required, and reclassifying the pixel when the reclassification

is required, as recited by independent claims 1 and 8. Fan₁ fails to disclose determining

intensity levels, and therefore <u>cannot</u> confirm a classification as recited by Appellants' claims.

Accordingly, Fan₁ also is unable to compare a pixel intensity level with a background

intensity level.

Fan₁ discloses a reclassification; however, the reclassification of Fan₁ is based on the

<u>size</u> of the object being reclassified. See Fan₁, paragraph [0027]. Additionally, Fan₁

discloses reassessing backgrounds to determine if the backgrounds are sweeps in step 412 of

Fig. 10. The reassessment is based on breaking up the background area into multiple (16) sub

regions and determining the maximum color difference between the regions. If the difference

is larger than a predetermined threshold, the background is reclassified as a picture object.

See Fan₁, Fig. 10 and paragraphs [0034] and [0035]. This is <u>not</u> confirming the classification

of the pixel <u>based on the determined background intensity level</u> of the image by <u>comparing</u>

<u>the intensity of the pixel with the determined background intensity level</u>, determining if

reclassification is required, and reclassifying the pixel when reclassification is required, as

recited by independent claims 1 and 8.

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2. Dependent Claims 2-7 and 9-14

Li fails to cure the deficiencies of Fan₁ described above with respect to claim 1 and 8 from which claims 2-7 and 9-14 depend. Accordingly, claims 2-7 and 9-14 are patentable over Fan₁ and Li, for at least the same reasons that claims 1 and 8 are patentable. Appellants request reversal of all rejections of claims 1-14.

B. Claims 15-22 Are Not Anticipated or Rendered Obvious by Fan₂ (U.S. Patent No. 5,850,474) or Fan₂ in view of Li (U.S. Patent No. 6,360,009)

1. Examiners Acknowledge the Impropriety of the Fan₂ Rejections

At the personal interview of November 6, 2007 between the Appellants' representatives and Examiner Woldemariam and his supervisor Examiner Ahmed, the Examiners openly acknowledged that the reference Fan₂ fails to anticipate the current application's claims. The interview summary states "The examiner agreed to withdraw the rejections based on U.S. Patent Number 5,850,974 [sic] to Fan et al." Although the summary states Patent No. 5,850,974, it is clear that this was a typographical error and the citation in the interview summary was meant to be, 5,850,474. 5,850,974 is to Kettl et al. and addresses fluid jets, and therefore is clearly not the patent intended to be cited in the interview summary. Thus, even the Examiner and his supervisor previously agreed that Fan₂ fails to disclose or render obvious the claim features of independent claim 15 and its dependent claims.

2. Independent Claim 15

Fan₂ discloses a method and apparatus for segmenting a page of image data into windows, and classifying the data within each window as a particular type of image data. Fan₂ discloses a process in which each pixel is examined and classified (Fig. 1, S101). The pixels are then broken into runs, and the runs are classified based on the pixel classification (Fig. 1, S103). Fan₂ discloses combining the runs to create windows (Fig. 1, S105) and

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statistics on the windows are generated (Fig. 1, S107). Subsequently, Fan_2 classifies the windows based on the statistics (Fig. 1, S109). Fan_2 repeats the pixel examination (Fig.1, S111), run determination (Fig. 1, S113) and window formation (Fig.1, S115), and labels all pixels with the classification of image type as was determined for the window within which the pixels reside (Fig. 1, S117). Fan_2 is silent with respect to backgrounds. Fan_2 fails to make any determinations regarding backgrounds, including determining a background intensity level of an image. Further, Fan_2 bases determinations on individual pixels, runs, and window statistics, and therefore Fan_2 fails to disclose or render obvious basing anything on substantially all the pixels of the images. Thus, Fan_2 fails to disclose or render obvious determining a background intensity level of an image, the background level being based on substantially all of the pixels of the image, as recited by independent claim 15.

Moreover, Fan_2 fails to disclose or render obvious checking the classification of at least a portion of the pixels of the image based on the determined background intensity level of the image and reclassifying pixels based on results of the checking step, as recited by independent claim 15. Fan_2 discloses a macro-detection step followed by a micro-detection step. Fan_2 fails to disclose or suggest checking classifications of pixels based on the background intensity level of the image. Fan_2 discloses a confidence factor that is associated with image runs. The confidence factor is based on the uniformity of intensities of only pixels within the run. See col. 6, lines 14-26. The confidence factor is used to indicate a probability that an image type classification is correct. Reclassifications may occur if the confidence factor is low. The reclassification is based on the context of surrounding image runs and/or the context of the previous scan line. See col. 6, lines 57-59. Thus, Fan_2 fails to disclose or render obvious checking classifications of pixels based on the background intensity level of the image, as recited by independent claim 15.
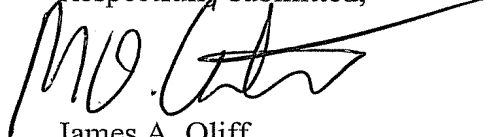
3.   Dependent Claims 16-22

Claims 16 and 22 depend from claim 15, and thus are patentable over Fan$_2$ for at least

the same reasons as claim 15. Li fails to cure the deficiencies of Fan$_2$ and therefore

dependent claims 17-21, which depend from claim 15, also are patentable. Appellants

respectfully request the Board to reverse all rejections of claims 15-22.

VIII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that the rejections

are in error and that claims 1-22 are in condition for allowance. For all of the above reasons,

Appellants respectfully request this Honorable Board to reverse the rejections of claims 1-22.

Respectfully submitted,

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APPENDIX A - CLAIMS APPENDIX

CLAIMS INVOLVED IN THE APPEAL:

1.   A pixel classification method, comprising:

determining a background intensity level of an image, the background intensity level being based on substantially all of the pixels of the image;

classifying a pixel of the image without adjusting an intensity of the pixel;

confirming the classification of the pixel based on the determined background intensity level of the image by comparing the intensity of the pixel with the determined background intensity level;

determining if reclassification is required; and

reclassifying the pixel when reclassification is required.

2.   The pixel classification method of claim 1, wherein the determining step comprises determining a white point of the image based on at least one characteristic of substantially all of the pixels of the image.

3.   The pixel classification method of claim 2, wherein the confirming step comprises comparing the intensity of the pixel with an intensity of the white point of the image.

4.   The pixel classification method of claim 3, wherein the reclassifying step includes reclassifying the pixel as background when the pixel is classified as a class eligible to be reclassified and the intensity of the pixel is not less than the intensity of the white point of the image.

5.   The pixel classification method of claim 3, wherein the reclassifying step includes reclassifying the pixel as one of smooth contone and an equivalent class when the pixel is classified as background and the intensity of the pixel is less than the intensity of the white point of the image.

6.   The pixel classification method of claim 1, wherein the determining step comprises identifying a spread of intensity levels of substantially all the pixels of the image and determining an intensity level of a majority of the pixels.

7.   The pixel classification method of claim 4, wherein the pixel is classified as smooth contone.

8.   A pixel classification apparatus, comprising:

a background intensity level determining module that determines a background intensity level of an image based on substantially all of the pixels of the image; and

an image processing module that classifies a pixel of the image without adjusting an intensity of the pixel, confirms the classification of the pixel based on the determined background intensity level of the image by comparing the intensity of the pixel with the determined background intensity level, determines if reclassification is required, and reclassifies the pixel when reclassification is required.

9.   The pixel classification apparatus of claim 8, wherein the background intensity level determining module determines a white point of the image based on a characteristic of substantially all of the pixels of the image.

10.   The pixel classification apparatus of claim 9, wherein the image processing module confirms the classification of the pixel by comparing the intensity of the pixel with the intensity of the white point of the image.

11.   The pixel classification apparatus of claim 10, wherein when a pixel is classified as a class eligible to be reclassified and the intensity of the pixel is not less than the intensity of the white point of the image, the pixel is reclassified as background.

12.   The pixel classification apparatus of claim 10, wherein when a pixel is classified as background and the intensity of the pixel is less than the intensity of the white point of the image, the pixel is reclassified as smooth contone.

13.   The pixel classification apparatus of claim 8, wherein the image processing module identifies a spread of intensity levels of substantially all the pixels of the image and determines an intensity level of a majority of the pixels.

14.   The pixel classification apparatus of claim 11, wherein the pixel is classified as one of smooth contone and an equivalent class.

15.   An image processing method, comprising:

determining a background intensity level of an image, the background level being based on substantially all of the pixels of the image;

classifying a pixel of the image;

checking the classification of at least a portion of the pixels of the image based on the determined background intensity level of the image;

reclassifying pixels based on results of the checking step; and

processing image data of the pixels of the image based on the classification of the pixels.

16.   The image processing method of claim 15, further comprising storing a label associated with each of substantially all of the pixels, wherein the label of each of substantially all of the pixels is based on results of the classification step and the checking step for the pixel.

17.   The image processing method of claim 15, wherein classifying a pixel of the image comprises classifying the pixel as one of smooth contone, rough contone, text, background, graphics and halftone.

18.   The image processing method of claim 15, wherein the determining step comprises determining a white point of the image based on a characteristic of substantially all of the pixels of the image.

19. The image processing method of claim 18, wherein the checking step comprises comparing an intensity of the pixel with an intensity of the white point of the image.

20. The image processing method of claim 19, wherein when the pixel is classified as smooth contone and the intensity of the pixel is not less than the intensity of the white point of the image, the pixel is reclassified as background.

21. The image processing method of claim 19, wherein when the pixel is classified as background and the intensity of the pixel is less than the intensity of the white point of the image, the pixel is reclassified as smooth contone.

22. The image processing method of claim 15, wherein the portion of the pixels comprises substantially all of the pixels of the image.

APPENDIX B - EVIDENCE APPENDIX

NONE

APPENDIX C - RELATED PROCEEDINGS APPENDIX

NONE